

# Self-perception of need to replace dentures and oral health-related quality of life: cross-sectional study nested in a Cohort in Southern Brazil

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**Aim:** With the significant increase in life expectancy over the last decades, it is important to understand how oral health can impact the oral health-related quality of life of older adults. This study aimed to investigate the association between need to replace dentures and oral health-related quality of life (OHRQoL) among older adults belonging to a Cohort in southern Brazil. **Methods:** This cross-sectional study was conducted with data from the 2019 Pelotas Elderly Cohort. The OHRQoL was assessed using the GOHAI. Need to replace dentures was self-report using a question dichotomized into yes/no. In the statistical analysis, unadjusted and adjusted models estimate from linear regression models were calculated. The significance level adopted was 5%. **Results:** A total of 493 older adults were included. On the GOHAI questionnaire, the mean score was 32.74 (SD±0.16). Individuals considering need of prosthesis replacement were 47.89%. Report of need to replace dentures was associated to lowest mean on the GOHAI score ( $\beta$  -1.14; 95%CI - 1.80; -0.478, and on the physical ( $\beta$  -0.56; 95%CI - 0.94 -0.17) and psychosocial ( $\beta$  -0.48; 95%CI - 0.74; -0.22) dimensions. **Conclusion:** Our findings highlight the importance of also considering subjective measures of oral health in the dental care of older adults, since reporting the need for denture replacement, regardless of the reason, was associated with a worse oral health-related quality of life, including physical and psychosocial aspects.

**Keywords:** Dentures. Quality of life. Oral health. Cross-sectional studies.

## Introduction

As a consequence of income and life expectations increase, global older adults' population has increased in recent decades. Some factors like a diet rich in vegetables, fruits, and grains, regular physical activity, social interaction, rising use of assistive technology and improvement in healthcare that contribute to the prevention of disabilities have reduced the risk of diseases and are associated with longevity<sup>1</sup>. Severe or complete tooth loss negatively impact essential daily functions, compromising the abilities of eating, speaking and social interaction, producing profound impacts in the individuals' quality of life, and increasing the risk of adverse health outcomes<sup>2</sup>.

Edentulism remains a significant public health worldwide, especially among the aging population. Although there is a decline in its prevalence over the last decade, it still affects about 2% of the world population<sup>3</sup>. Edentulism has a hazardous effect on the Oral health related quality of life (OHRQoL) impairing the functional capacity, the physical, psychological and social ability<sup>4</sup>. Conventional total dentures are currently the most used treatment option for the rehabilitation of edentulous individuals because it is an economical and esthetically acceptable treatment<sup>5</sup>.

Studies have demonstrated the influence of complete dentures therapy on the OHRQoL of older populations<sup>6,7</sup>. New dentures can provide significant improvements to functional aspects, such as ability to chew and speaking, comfort and retention<sup>8,9</sup>, while wearing poor-fitting dentures may lead to discomfort and chewing difficulties<sup>9</sup>. Furthermore, rehabilitation with complete dentures is associated with improvements in the aesthetic appearance, which is fundamental to individual's wellbeing. New and well-fitting dentures increase the individual's self-confidence and improve their quality of life<sup>8-11</sup>.

Although randomized clinical trials have demonstrated that the use of dentures improves oral health-related quality of life among older adults<sup>12-14</sup>, studies with a cohort sample of elderly people that investigate self-perception about the need to change prostheses relating to quality of life are scarce in the scientific literature. Subjective health conditions are important and significantly impact individuals' life. This study investigated the association between need to replace dentures and oral health-related quality of life among older adults belonging to cross-sectional study nested in a cohort in southern Brazil.

## Methods

### Study setting and sampling

The "COMO VAI?" ("HOW ARE YOU?") study (*Consórcio de Mestrado Orientado para a Valorização da Atenção ao Idoso*) (Masters Consortium for Valuation of Older Care) is a cohort study that has been conducted in Pelotas, a city located in Southern Brazil with about 340 000 inhabitants<sup>15</sup>. Eligibility criteria included non-institutionalized individuals older than 60 years, living in the urban area of the Pelotas city.

Three follows-up were conducted: a) Baseline in 2014 year; b) First follow-up in 2016; c) Second follow-up in 2019 year<sup>15</sup>. For the baseline study, a representative sample was

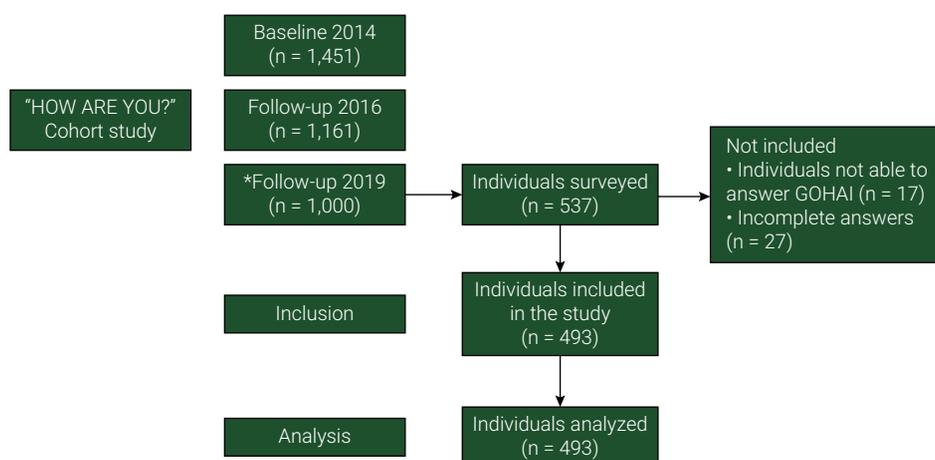
obtained from two sampling stages. Initially, household conglomerates were selected through data from the 2010 Demographic Census, from which 469 census sectors were considered ordered according to the average income of the head of the family. This strategy ensured the inclusion of several neighborhoods in the city and with different economic situations. Afterwards 31 households would be randomly selected in each sector, considering that at least 12 older adults would be identified per tract. Of the 1,844 eligible participants, 393 (21.3%) were losses and refusals. At the end, 1,451 older adults participated of the baseline study. Data collection included face-to-face interview, anthropometric measurements, and physical performance exams in participants' homes.

In 2016, the first follow-up was via telephone interview with the aim of locating the elderly participants at the baseline in 2014 and monitoring the occurrence of risk factors, signs and symptoms of diseases of public health interest. In this stage, 1,161 elderly people participated, in addition to 145 losses and/or refusals.

## Study design

The present cross-sectional study included data collected from second follow-up performed in 2019 year. The STROBE checklist was followed to report this study<sup>14</sup>. The follow-up flowchart is shown in Figure 1.

Considering the mortality rate, 1,000 older adults were estimated to be eligible for the second follow-up. Data collection included face-to-face home interviews. A questionnaire, anthropometric measurements and physical performance tests were performed. The questionnaire included questions about socioeconomic and demographic characteristics, general and oral health. Interviews were carried out primarily with the elderly. If the elderly were unable to answer the questions accurately, participation of a caregiver or family member was requested. On March 11, 2020, this follow-up was interrupted due to COVID-19 pandemic. Therefore, of the 1,000 elderly people estimated to participate, 537 interviews were performed, and 58 deaths were identified.



\*Follow-up 2019 was interrupted due to COVID-19 pandemic.

**Figure 1.** Flowchart describing the sample according to the STROBE guideline.

## Outcome variable: Oral Health-related Quality of Life (OHRQoL)

Oral Health-related Quality of Life was assessed using the Geriatric Oral Health Assessment Index (GOHAI), an instrument that evaluates oral health self-perception in older adults<sup>16</sup>. The GOHAI consists of 12 questions with three answer options (always, sometimes and never). Total score ranges from 12 to 36 points. The higher the value, the better the self-perceived oral health. The total score is classified as high (> 34), moderate (30 to 33) and low (< 30)<sup>16</sup>. The GOHAI is also presented in three dimensions, as following: a) physical dimension (feeding, speech and swallowing), psychosocial dimension (appearance, social relationship), and pain or discomfort. For analytical purposes, it was considered the global score and the scores of the three dimensions as a continuous variable.

## Exposure variable

The exposure variable considered was the need to replace dentures. The need to replace denture was evaluated through the question "Do you think you need to replace the denture that you are using?". Possible answers were yes and no.

## Covariates

Covariates included gender (female and male), age (60-69 years, 70-79 years, and  $\geq 80$  years at the baseline), skin color (white and non-white), education, socioeconomic position (SEP), and oral health satisfaction. Schooling was categorized as nonliterate, < 8 years,  $\geq 8$  years. The SEP was measured using the National Economic Indicator (IEN - *Indicador Econômico Nacional*) developed from 12 material assets and the level of education of the head of the family, combined through principal component analysis<sup>17</sup>. The IEN was classified into quintiles: first quintile as the lowest IEN and the fifth as the highest IEN.

The variable Oral Health Satisfaction was assessed through the question: "How much are you satisfied with the health of your teeth and your mouth?" (very satisfied, satisfied, dissatisfied, and very dissatisfied).

## Ethical Aspects

This study was approved by the Research Ethics Committee of the School of Medicine of the Federal University of Pelotas under protocol number 54141716.0.0000.5317. The participation of individuals in the study was voluntary. All participants signed a consent term.

## Statistical Analysis

A descriptive analysis estimating absolute and relative frequencies and means (standard deviation) of the variables of interest was performed. Unadjusted and adjusted linear regression coefficients were calculated to assess the effect of the need to replace dentures on the OHRQoL. Robust variance estimates were used in linear regression models to deal with heteroscedasticity. The adjustment variables were gender, skin color, age, socioeconomic position, schooling, and oral

health satisfaction. These socioeconomic characteristics have been suggested as confounding factors in conceptual theoretical models in the literature<sup>2</sup>. The significance level was set at  $p < 0.05$  and confidence level of 95 (95% CI).

## Results

Of the 537 elderly people interviewed, 17 questionnaires were answered by other people, such as the caregiver or person responsible for the elderly person. For analysis purposes, interviews answered by someone other than the elderly were not considered in this study. Besides, only complete cases related to the GOHAI questionnaire were considered. Thus, 493 older adults' participants were included.

According to the description of the individuals who answered the GOHAI ( $n=493$ ), it was observed that 60.2% ( $n=297$ ) were in the age group of 60-69 years and 65.9% ( $n=325$ ) were women. The majority of sample had white skin color 80.7% ( $n=398$ ). About schooling, almost 60% ( $n=342$ ) had studied less than 8 years and 22.1% ( $n=103$ ) belonged to the third SEP quintile (data not shown in table).

**Table 1.** Description of the sample (baseline 2014 and follow up 2019).

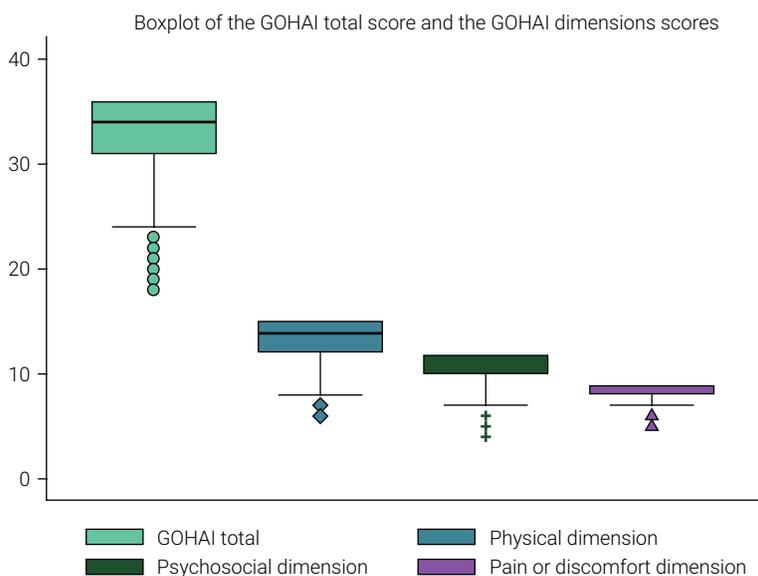
	Follow up 2014		Follow up 2019		p-value*
	N (%)	IC (95%)	N (%)	IC (95%)	
Gender					0.331
Female	914(63)		349 (65.4)	61.1-69.4	
Male	537 (37)		185 (34.6)	30.6-38.8	
Age					0.003
60-69 years	756 (52.3)		311 (58.4)	54.1-62.6	
70-79 years	460 (31.8)		168 (31.5)	27.5-35	
≥80 years	230 (15.9)		54 (10.1)	67.6-12.9	
Skin Color					0.390
White	1,211 (83.7)		431 (80.9)	77.2-84.1	
Black	168 (11.6)		71 (13.3)	10.5-16.5	
Brown	68 (4.5)		29 (5.4)	3.7-7.7	
Yellow	1 (0.1)		1 (0.2)	0.05-0.10	
Indigenous	1 (0.1)		1 (0.2)	0.05-0.10	
Socioeconomic position					0.747
1° quintile	282 (20.5)		93 (18.3)	15.1-21.9	
2° quintile	269 (19.6)		96 (19)	15.6-22.6	
3° quintile	275 (20)		110 (21.7)	18.1-25.5	
4° quintile	274 (20)		109 (21.5)	17.9-25.3	
5° quintile	273 (19.9)		99 (19.5)	16.1-23.2	

Continue

Continuation		
Schooling		
Nonliterate		56 (11.4)
< 8 years		286 (58.1)
≥ 8 years		150 (30.5)
TOTAL	1,451	534

The total in each variable can vary due to missing data. \* $p < 0.05$ .

Around ¼ of the sample reported using dentures (75.5%), and more than half (51.1%) reported no need for a denture replacement and were satisfied with their oral health (75.8%) (very satisfied 86;17.5% and satisfied 287;58.3%) (data not shown in table). In relation to OHRQoL, the mean GOHAI total score was 32.7 (SD±0.16). When the Physical, Psychosocial and Pain or discomfort dimensions were considered, the means 13.2 (SD±0.09), 11.0 (SD±0.07) and 8.5 (SD±0.04) were observed (Figure 2).



**Figure 2.** Boxplot of the GOHAI total score and the GOHAI dimensions scores.

Comparing baseline and follow-up samples, in both evaluations the participants were mostly female, the majority were in the 60-69 age group, and self-reported white skin color. Statistically, the only significant difference found between the two samples was in age ( $p < 0.003$ ). Noteworthy, this difference occurred in the category over 80 years and was due to the mortality rate of the participants. There was no significant difference between the other characteristics (Table 1).

Table 2 shows unadjusted and adjusted estimates from linear regression models evaluating the association between the need to replace dentures and the GOHAI

outcomes. The need for denture replacement was associated with a decrease in the GOHAI scores and in the GOHAI dimensions. After adjustments, only the association between the need to replace dentures and the pain or discomfort dimension was vanished ( $\beta$  -0.11 [95%CI -0.27; 0.07] p-value 0.208). However, those individuals who reported the need to replace their dentures presented a decrease in the GOHAI scores ( $\beta$  -1.14 [95%CI -1.80; -0.48] p-value <0.001) and in the GOHAI dimensions, including Physical ( $\beta$  -0.56 [95%CI -0.94; -0.17] p-value 0.005), and Psychosocial ( $\beta$  -0.48 [95%CI -0.74; -0.22]) dimensions.

**Table 2.** Unadjusted and Adjusted estimates from linear regression models evaluating the association between the need to replace dentures and the GOHAI outcomes.

Outcomes	Exposure Need to replace dentures (yes)					
	Unadjusted Analysis			Adjusted Analysis*		
	$\beta$	CI (95%)	p-value	$\beta$	CI (95%)	p-value
GOHAI score	-2.07	-2.75; -1.38	<0.001	-1.14	-1.80; -0.48	0.001
Physical Dimension	-0.74	-1.11; -0.36	<0.001	-0.56	-0.94; -0.17	0.005
Psychological Dimension	-1.02	-1.33; -0.72	<0.001	-0.48	-0.74; -0.22	0.001
Pain or discomfort Dimension	-0.31	-0.47; -0.14	<0.001	-0.11	-0.27; 0.07	0.208

\*Adjustment for: gender, skin color, age, socioeconomic position, schooling and oral health satisfaction.

## Discussion

The overall results showed that individuals who reported a need to replace their dentures had lower means in the GOHAI index, especially on the physical and psychological dimensions. However, our results should be interpreted with caution considering some limitations. The COVID-19 Pandemic restrictions interrupted the collection of follow-up data in March 2020. Thus, we were not able to interview the elderly cohort. Even though, the surveyed sample did not differ from the original cohort population. Furthermore, it is important to emphasize that the research focused on only one city in region of the country. Another limitation is the cross-sectional design of the study that impaired the establishment of causal inference between the investigated factors.

Nevertheless, the study has several strengths, including the quality of the sampling method—systematic and representative or population based—the use of well-recognized methods, and trained interviewers. Also, subjective measures, such as the perceived need to replace the denture and the self-perception of oral health, reflects individuals' interpretation of their health status and it's based on the social, cultural and historical context of their lives<sup>11</sup>. Normative use of prosthesis usually is higher than the subjective perceived need, except when anterior losses are present. Therefore, subjective evaluation could reflect better the real need of dental prosthesis, worse socioeconomic conditions may reflect greater tooth loss, lack of prosthetic rehabilitation and non-use of dental services<sup>18</sup>. Some authors also stated that the older population often seems to perceive their oral health conditions to be favorable<sup>18,19</sup>, even when the clinical conditions are poor, accepting disabilities as

something normal of aging, not realizing their need. This can probably impact on their quality of life<sup>5,18,20,21</sup>.

In the present study, around ¾ of the sample reported to use dentures, finding similar to that observed in the Brazilian National Oral Health Survey of 2010<sup>3</sup>. In addition, most of older adults reported satisfaction with their oral health, corroborating with previous findings from the literature<sup>7,8</sup>, being such satisfaction attributed to the acceptance of this population to oral health problems as a natural consequence of the aging process<sup>19</sup>.

Aging process seems to be associated with personal beliefs and values, which may lead older people to believe that there is no way to avoid pain and illness, affecting their self-perception of oral conditions<sup>21</sup>. Two studies conducted in India showed positive changes in the OHRQoL of the older adults after prosthetic rehabilitation<sup>6,21</sup>. Despite a short follow-up period, the individuals reported improvement in functional changes after placement of complete dentures compared to the previous condition (edentulism)<sup>6,21</sup>. An improvement in masticatory performance and OHRQoL was also observed after the installation of dentures in studies that used instruments other than the GOHAI to measure the OHRQoL<sup>10,22</sup>. A study conducted in Brazil, taking data from the last National Oral Health Survey, observed that the use of prosthetic replacements increased the OHRQoL (measured by using Oral Impact on Daily Performance -OIDP- questionnaires) from adults and elder adults<sup>23</sup>.

In the present study, individuals who reported need to replace dentures had a decrease in the GOHAI score, which means a worsening in their quality of life<sup>16</sup>. We also found a difference between individuals who perceived and those who did not perceive the need to change dentures in the mean of the physical dimension, which can be related to the maladaptation and retention of dentures, negatively affecting the capacity of chewing, eating and talking to the individuals<sup>9</sup>. Other studies that evaluated older individuals who had problems such as discomfort due to unsatisfactory complete dentures, found that the replacement for new dentures resulted in an improvement in satisfaction with oral health and in the OHRQoL score, mainly in aspects of eating, smiling, social relation, and chewing efficacy<sup>8,9</sup>.

Based on our findings, the authors hypothesize that more important than the use of dental prosthesis is the individual's satisfaction with their dentures, including aesthetic and functional aspects, directly impacting the OHRQoL. Old dentures could bring discomfort to users due the prolonged use of them, becoming worn, impairing the chewing capacity of food and the person's phonetics. In addition, a more retentive/stable denture, like a new denture, could be associated with an improvement in OHRQoL<sup>4,9,20,22</sup>. Another important aspect is that poorly fitted dentures can restrict the diet and make people feel socially uncomfortable. Individuals with prosthetic rehabilitation show improvement in the psychosocial and physical dimensions<sup>5</sup>. The combination of diet and a complete denture treatment can improve food intake in edentulous patients<sup>10</sup>. It is also important to highlight that the aesthetic appearance is fundamental to one's mental wellbeing and social relationship. The rehabilitation with new dentures can make it possible for individuals to get comfortable smiling, speaking and may raise a patient's self-esteem and self-confidence levels<sup>9</sup>.

Regarding the pain or discomfort dimension, after adjusting the analysis for socioeconomic characteristics, no difference was found regarding the need for replacement of dentures. This finding is in agreement with another study that found positive improvement in all dimensions, except for pain<sup>5</sup>. The most likely explanation for this observation is related to the more resilience observed in older adults, which believe the idea that it is normal to feel pain, being not bothered, but rather considering as part of their daily lives and the aging process<sup>21</sup>.

The complete lack of teeth (edentulism) is associated with depression, therefore, the use of complete dentures could also contribute to improve elder adults mental health<sup>24</sup>. In Brazil, the National Oral Health Policy ensures free-of-charge oral rehabilitation using dental prosthesis within the Unified Health System (Brazilian acronym SUS)<sup>23,25</sup>. Despite of this, the reality is that the access remains limited. Accredited laboratories do not cover all regions of the country and the demand is high, while the delivery of dentures is low<sup>25</sup>. The provision of dental prostheses in the public health system enables the universalization of this service<sup>25</sup>. Considering the poor oral health condition of Brazilian older adults, there is an important need for expansion of the access for free prosthetic rehabilitation and improvement of these services<sup>3,23</sup>.

## Conclusion

Our findings showed an association between the need for denture replacement and lower averages in the GOHAI score, including the physical and psychosocial dimensions. However, no differences were found for the pain or discomfort dimension. To know the perception of the older adults in relation to their need for denture replacement, regardless of the reason, highlight the importance of also considering subjective measures of oral health in the dental care of older adults.

## Data availability

Datasets related to this article will be available upon request to the corresponding author.

## Conflict of interest

None

## Author contributions

All authors conceived the ideas; S.A.K., M.G.C., S.S collected the data; M.G.C., S.A.K. analyzed the data; M.G.C, S.A.K. and S.S. led the writing. F.F.D and R.T.B. reviewed the manuscript. All authors reviewed and approved the final version of the manuscript.

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